

***Thulinus*, new generic name substituting for *Thulinia* Bertolani, 1981 (Tardigrada, Eutardigrada)**

ROBERTO BERTOLANI

Department of Animal Biology, University of Modena and Reggio Emilia, via Campi 213/D, 41100, Modena, Italy; bertolani@unimore.it

Abstract

Due to a homonymy with a genus of Trematoda described two years before, the name *Thulinia* Bertolani, 1981 cannot be used for a genus of tardigrades. Therefore, *Thulinus* nomen novum is proposed for a genus of tardigrades (Eutardigrada, Hypsibiidae), in substitution of *Thulinia*, junior homonym. The complicated taxonomic history of the genus *Thulinus* and especially of one of its species is discussed. The characteristics of the genus and the main distinctive characters of the species are also reported.

Key words: Tardigrada, Eutardigrada, *Thulinus*, *Thulinia*

A new genus of Hypsibiidae (Eutardigrada, Parachela) was erected about twenty years ago (Bertolani 1981) and dedicated to Gustav Thulin, a very good and too often neglected expert on tardigrades during the early part of the past century, who first approached the study of tardigrades from a phylogenetical point of view. Unfortunately, I did not note that two years earlier Gibson and Bray (1979) erected a new genus of Trematoda with the name *Thulinia*. The tardigrade genus *Thulinia* was erected on the basis of the presence of 12 peribuccal lamellae (Bertolani 1981). Subsequently, using scanning electron microscopy, Bertolani *et al.* (1999) emphasized that the buccal lamellae of *Thulinia* are partly fused together. The first time that peribuccal lamellae were used as a distinctive character for a genus was in Schuster *et al.* (1980), who separated the Hypsibiidae *Pseudobiotus* Nelson, 1980 (with about 30 irregular lamellae) from *Isohypsibius* Thulin, 1928 (without lamellae) and the Macrobiotidae *Minibiotus* Schuster, 1980 (with 10 papulae instead of 10 lamellae) from *Macrobiotus* C.A.S. Schultze, 1834 (with 10 lamellae). The presence of 12 lamellae in *Thulinia* was considered a distinctive character with respect to *Pseudobiotus* (with *Isohypsibius*-type claws like those of *Thulinia* but with about 30 irregular lamellae around the mouth opening, as previously stated) and to all other genera of Hypsibiidae (which always lack peribuccal lamellae). On the other hand, peribuccal lamellae are present in other families of Parachela (Macrobiotidae and Eohypsibiidae) and in all the genera of the order Apochela. The peribuccal lamellae of Apochela, even though probably homologous to those of Parachela, are quite different in shape and number with respect to those of Parachela. Within the Parachela, the peribuccal lamellae of Macrobiotidae are 10 in number, those of Eohypsibiidae 14 in number. Therefore, the presence of lamellae should be considered

a plesiomorphic character within Hypsibiidae, but the number 12 of lamellae and their peculiar partial fusion can be considered autoapomorphies for the genus *Thulinia*. When *Thulinia* was erected, only two species were included in the genus. Further studies evidenced that another species, formerly included in *Pseudobiotus*, should be attributed to *Thulinia* on the basis of a re-examination of the type material (Bertolani *et al.* 1999). The species was described as *Macrobiotus augusti* by James Murray (1907). We must remember that, at the beginning of the past century, all Parachela (the actual order not yet erected at that time) were attributed to the genera *Macrobiotus*, or to *Diphascon* when a rigid buccal tube was followed by a flexible pharyngeal tube. With the erection of the genus *Isohypsibius* by Thulin (1928), *M. augusti* was transferred in that genus. Marcus (1929, 1936) considered *Isohypsibius* a subgenus of *Hypsibius* Thulin, 1911 (reconsidered as a genus only in 1969 by Pilato) and in 1929 re-described *Hypsibius* (*Isohypsibius*) *augusti* (Thulin, 1928), unfortunately adding characters not neglected but absent in the type material. The description of *H. (I.) augusti* by Marcus was reported by Ramazzotti (1962, 1972) and by Bertolani (1982) in their monographs, even though van der Land (1966) had published a re-description of the type material. Further confusion was produced by these wrong descriptions in the diagnosis of this species and in the definition of its further characters, *e.g.*, details of the buccal armature, claws and chromosomes (Pilato 1974; Bertolani 1976). In particular, the wrong description of the species was utilized to erect the new genus *Pseudobiotus* by Nelson (in Schuster *et al.* 1980). In practice, the character considered to erect the genus *Pseudobiotus* (about 30 peribuccal lamellae) was present in the wrong description, but absent in the true *Pseudobiotus augusti* (Murray, 1907). Two papers at the end of the past century reconsidered the problem. On the basis of observations of the type material, Bertolani *et al.* (1999) transferred *augusti* from *Pseudobiotus* to *Thulinia* and Nelson *et al.* (1999) re-described the material used to erect the genus *Pseudobiotus* and erroneously cited *P. augusti* as a new species (*Pseudobiotus kathmanae* Nelson *et al.*, 1999), indicating it as new type species of the genus.

This intricate situation related to the genus *Thulinia* should be considered by many taxonomists in a moment of reflection.

In addition, (and I hope, finally) the accident of the homonymy.

In accordance with Article 60 of the International Code of Zoological Nomenclature, Fourth Edition (1999), I propose to substitute for the junior homonym name *Thulinia* the nomen novum *Thulinius*: type species *Isohypsibius stephaniae* Pilato, 1974. Similarly, Pilato and Binda (1989) proposed the nomen novum *Richtersius* instead of the junior homonym *Richtersia*. A difference only in a desinence (*Thulinius* and *Thulinia*, *Richtersius* and *Richtersia*) should not create confusion, since in both cases the genera with similar names belong to different phyla.

***Thulinius* nomen novum**

Diagnosis. Mouth opening with 12 small, partially fused peribuccal lamellae (Fig. 1A) surrounded by six peribuccal lobes, sometimes subdivided into a larger number of irregular sublobes (Fig. 1B); crest-shaped apophyses for the insertion of the stylet muscles on the buccal tube (Fig. 1C), claws of *Isohypsibius*-type (Fig. 1, E,F,G).

Etymology. Dedicated to Gustav Thulin, an excellent Swedish researcher.

Type species. *Isohypsibius stephaniae* Pilato, 1974

Composition. *T. stephaniae* (Pilato, 1974), *T. ruffoi* Bertolani, 1981, *T. augusti* (Murray, 1907)

Remarks. The three species are characterized by a buccal armature with a posterior band of

fine teeth, followed by a line of bigger round teeth (Fig. 1A,B), instead of transverse mucrones, as in several other genera of Hypsibiidae, Macrobiotidae and Eohypsibiidae, and by rows of macroplacoids, whose curvatures resemble a Grecian urn (Fig. 1D). The species differ together mainly for the shape of the cuticular structures of the legs. *Thulinius ruffoi* (Fig. 1F) differs from *T. stephaniae* (Fig. 1G) in having thinner claws with longer tapering basal tract, lunules evident and a less prominent cuticular bar below the claws of the first three pair of legs (other than for a more slender body). *Thulinius augusti* differs from the other two species by the presence of a particularly long and thin basal tract of the claw, especially in the external one, from *T. stephaniae* also by a weaker cuticular bar below the claws of the first three pair of legs, and from *T. ruffoi* also by the absence of lunules. The subdivision of the lobes into sub-lobes (Fig. 1B) is another possible difference between *T. augusti* and the other two species.

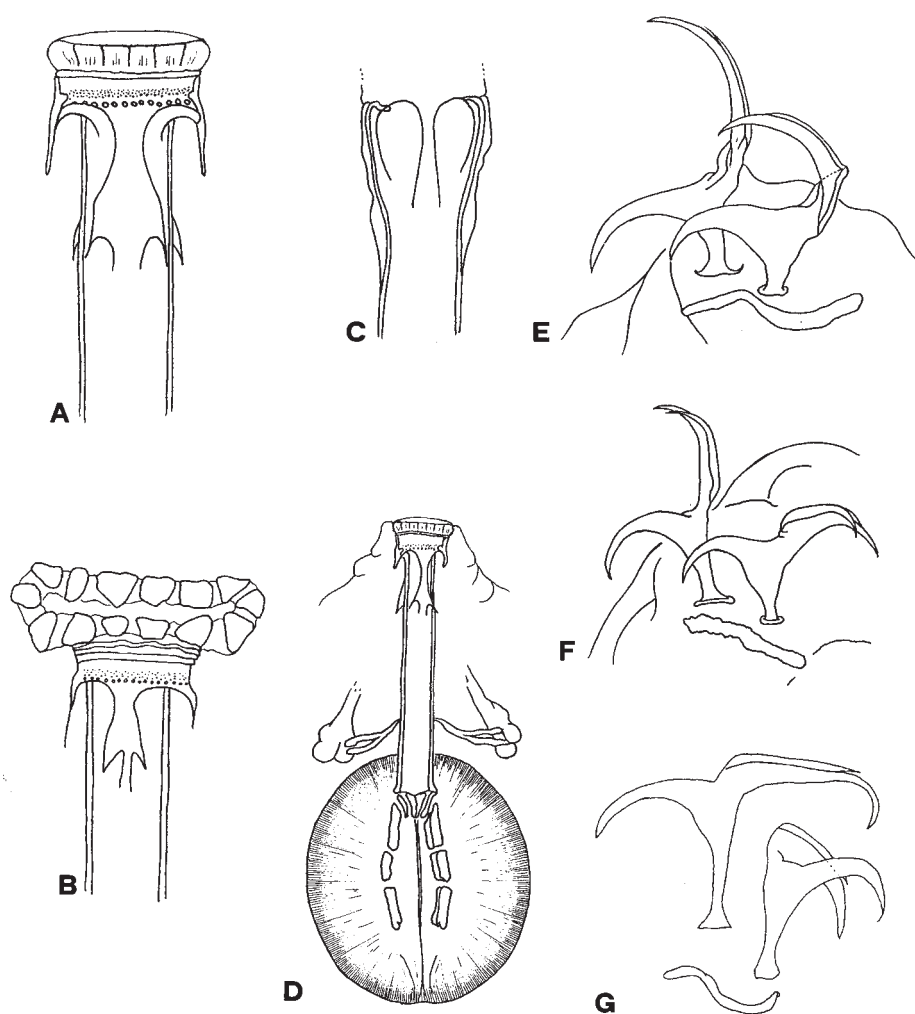


FIGURE 1 – Details of sclerified structures in *Thulinius*. **A**: buccal armature; **B**: subdivided lobes in *T. augusti*; **C**: crest-shaped apophyses for the insertion of the stylet muscles on the buccal tube; **D**: buccal-pharyngeal apparatus. Claws on the third pair of legs in **E**: *T. stephaniae*, **F**: *T. ruffoi*, **G**: *T. augusti*. (A and D modified from Bertolani (1982); C, E and F from Bertolani (1982); B and G from Bertolani *et al.* (1999)).

Acknowledgments

I thank Prof. Giovanni Pilato, of the University of Catania, Italy, who kindly reported the homonymy to me and Dr. Clark W. Beasley, McMurry University, Abilene, Texas, U.S.A., for the English revision of the text. This work was supported by an ex 60% M.U.R.S.T grant.

References

- Bertolani, R. (1976) Osservazioni cariologiche su *Isohypsiobius augusti* (Murray, 1907) e *I. megalonyx* Thulin, 1928 (Tardigrada) e ridefinizione delle due specie. *Bollettino di Zoologia*, 43, 221–234.
- Bertolani, R. (1981) A new genus and five new species of Italian fresh-water tardigrades. *Bollettino del Museo Civico di Storia Naturale di Verona*, 8, 249–254.
- Bertolani, R. (1982) Tardigradi (Tardigrada). Guide per il riconoscimento delle specie animali delle acque interne italiane. *Quaderni CNR*, AQ/1/168, 15, 1–104.
- Bertolani, R., Marley, N. & Nelson, D.R. (1999) Re-description of the genus *Thulinia* (Eutardigrada, Hypsibiidae) and of *Thulinia augusti* (Murray, 1907) comb. n. *Zoologischer Anzeiger*, 238, 139–145.
- Gibson, D.I. & Bray, R.A. (1979) The Hemiuroidea: terminology, systematics and evolution. *Bulletin of the British Museum (Natural History) (Zoology Series)*, 36, 35–146.
- International Code of Zoological Nomenclature. Fourth edition (1999). The International Trust for Zoological Nomenclature, London.
- Land, J., van der (1966) The Tardigrada of the Scottish Lake Survey described as new species by James Murray. *Proceedings of the Royal Society of Edinburgh*, Section B, 69, 298–320.
- Marcus, E. (1929) Tardigrada. *Klassen und Ordnungen des Tierreichs*. H.G. Bronns (Ed.), Leipzig, 5, 1–608.
- Marcus, E. (1936) Tardigrada. In: *Das Tierreich*. W. de Gruyter (Ed.), Berlin und Leipzig, 66, 1–340.
- Murray, J. (1907) Scottish Tardigrada, collected by the Lake Survey. *Transactions of the Royal Society of Edinburgh*, Part III, 45, 641–668.
- Nelson D.R., Marley, N.J. & Bertolani, R. (1999) Re-description of the genus *Pseudobiotus* (Eutardigrada, Hypsibiidae) and of the new type species *Pseudobiotus kathmanae* sp.n. *Zoologischer Anzeiger*, 238, 311–317.
- Pilato, G. (1969) Evoluzione e nuova sistemazione degli Eutardigrada. *Bollettino di Zoologia*, 36, 327–345.
- Pilato, G. (1974) Struttura dell'armatura boccale di alcune specie di *Isohypsiobius* (Eutardigrada). *Animalia*, 1, 43–58.
- Pilato, G. & Binda, M.G. (1989) *Richtersius*, nuovo nome generico in sostituzione di *Richtersia* Pilato e Binda, 1987 (Eutardigrada). *Animalia*, 16, 147–148.
- Ramazzotti, G. (1962) Il Phylum Tardigrada. *Memorie dell'Istituto Italiano di Idrobiologia*, 16, 1–595.
- Ramazzotti, G. (1972) Il Phylum Tardigrada (seconda edizione aggiornata). *Memorie dell'Istituto Italiano di Idrobiologia*, 28, 1–732.
- Schuster, R.O., Nelson, D.R., Grigarick, A.A. & Christenberry, D. (1980) Systematic criteria of the Eutardigrada. *Transactions of the American Microscopical Society*, 99, 284–303.
- Thulin, G. (1928) Über die Phylogenie und das System der Tardigraden. *Hereditas*, 11, 207–266.